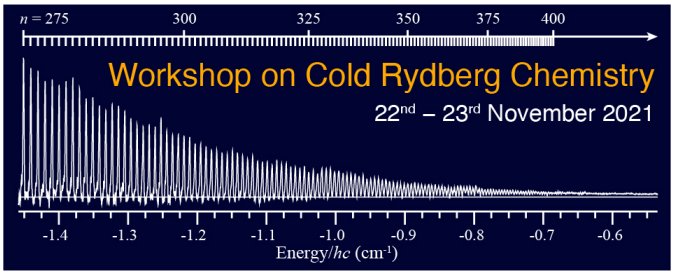

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Rydberg-atom-ion molecules: Vibrational levels and lifetimes

Monday 22 November 2021 19:00 (30 minutes)

We present calculations on a novel type of Rydberg dimer consisting of a Rydberg-state atom bound to an ion. The molecule is formed through long-range electric-multipole interaction between the Rydberg atom and a point-like ion. Potential energy curves that are asymptotically connected with Rydberg nP-states of rubidium or cesium are found to be conducive to metastable Rydberg-atom-ion molecules with many bound vibrational states. We compute vibrational spectra, and obtain non-adiabatic-decay rates using the Born-Huang representation. The decay rates generally increase with Rydberg-state principal quantum number and vibrational quantum number. Irregularities in the decay rates are caused by interference of multiple decay paths on the potential energy curves.

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